NETWORK GRAPHS AND THE CASE FOR VIRTUAL REALITY

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Network Maps (Graphs)

A diagram in which discrete entities are represented by "nodes" and relationships (links or connections) between those entities are represented by edges.

Edges
Nodes

Directed Acyclic Graphs (DAGs)

- Specific type of graph
  - **D**irected: Single-headed arrows show direction of relationship
  - **A**cyclic: No loops ("cycles"); relationship goes one way and there are no directed paths back to a node once we've left it
  - **G**raph: Representation with nodes and edges

- DAGs are used to represent <u>causality</u>

General network representation

DAG

Why VR?

Astronaut flight network, 1961-2012

- Network maps may be thought of as two-dimensional projections of fundamentally three-dimensional

- Unlike in geographic mapping, this will not lead to distortion, but can make the map difficult to understand

- Visualizing in a 3D VR environment allows us to "get inside" the network and actually see more detail

Human Systems Risk Board

- Role is to "ensure a consistent, integrated process for managing human system risks that are critical to successful human exploration beyond low Earth orbit."

- Traditionally, risks have been considered, researched, and managed in risk custodial teams, but with minimal view of inter-relation of risks.

- Several attempts have been made to visualize risk interrelatedness, but none have caught on.

- HSRB will be constructing a DAG to represent the NASA Human Systems Risk Network.

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